CLAIMS

What is claimed is:

1. The method of forming a composite belt structure for a tire, the method comprising the steps of:

applying a multicord reinforced strip having a strip width S_W onto a rotating crowned building drum, the strips being wound in a zigzag configuration to form at least two zigzag layers wherein the crowned drum has the non-overlapping portions of the strips placed in a central portion and extending in alternation to a pair of shoulder portions having the portions of the strips overlapping, the central portion having a maximum diameter D_o and the shoulder portions have a minimum diameter D_i, the adjacent strips being placed apart from 0 to 2 mm in the central portion and the strips are increasingly overlapping in each shoulder portion as the strips extend from the central portion toward lateral ends of the belt structure to form belt layers of a composite belt structure having the cords per inch in the shoulder portion as measured axially inwardly from the axially inner edge of the strip adjacent the lateral ends of the narrowest radially outer belt layer radially inwardly greater than the cords per inch in the central portion as measured centered on the centerplane of the belt structure.

2. The method of forming a composite belt structure of claim 1 wherein the strips in the non-overlapping center region occupy at least 50% of the belt width W, W being measured at the lateral extremes or edges of the widest belt layer, and each overlapping shoulder portion occupies 25% or less of the belt width.

3. The method of forming a composite belt structure of claim 2 wherein the overlapping of strips in each shoulder portion ranges from greater than 0% adjacent the central portion up to 100% at the outermost lateral edge of the belt.

4. The method of forming a composite belt structure of claim 1 having both zigzag and spirally wound layers and wherein only the strips of the zigzag layers overlap as the strip is wound away from the center region toward the lateral edge.

5. The method of forming a composite belt structure of claim 4 wherein the

overlap of each adjacent zigzag strip adjacent to a turning point at the lateral edge overlaps at a distance of 50% or more of the strip width S_W.

6. The method of forming a composite belt structure of claim 1 wherein the step of applying the strip to the crowned building drum includes passing the strip from a linear moving strip the linear movement being parallel to and spaced a fixed distance of the axis of rotation of the crowned building drum.

7. A pneumatic tire having a carcass and a belt reinforcing structure, the belt reinforcing structure comprising:

a composite belt structure of cord reinforced layers including at least two radially outer zigzag belt layers, each outer zigzag belt layer having cords inclined at 5 to 30 degrees relative to the centerplane of the tire extending in alternation to turnaround points at each lateral edge, and at least one spirally wound belt layer having cords wound spirally at an inclination of 5 degrees or less relative to the tire's centerplane and located radially inward of the at least two radially outer zigzag belt layers, and the distance between the lateral edges of the widest belt layer define the belt width W, and

wherein each zigzag belt layer is formed by a continuous strip of two or up to 20 cords, the strips having a strip width S_W and edges spaced apart a distance of 0 to 2 mm in a central portion occupying at least 50% of the belt width W and in each shoulder portion occupying 25% or less of W the edges of the adjacent strips within a layer are overlapping to form a belt having the cords per inch greater in the shoulder portions than the central portion.

8. The pneumatic tire of claim 7, the belt reinforcing structure further comprising:

at least one spiral wound belt layer; and

at least two radially inner zigzag layers, the radially inner zigzag belt layers being positioned between the carcass and the at least one spiral wound belt layer, each radially inner zigzag belt layer having cords wound in alternation at an inclination of 5 degrees to 30 degrees relative to the centerplane of the tire to turnaround points at each lateral edge of the belt layer.

9. The pneumatic tire of claim 7 wherein the overlapping of the adjacent strips in each zigzag layer ranges from greater than 0% of the strip width to 100%.

10. The pneumatic tire of claim 8 wherein the composite belt structure has at least five belt layers, two radially inner zigzag belt layers, one or more spirally wound belt layer and two radially outer zigzag belt layers.

11. The pneumatic tire of claim 10, the tire being an aircraft tire having one or more radial plies in the carcass.

12. The pneumatic tire of claim 7 wherein the belt structure has X cords per inch as measured in the central portion centered on the centerplane in an area W_C measuring one inch axially, and at a location in the shoulder portion at the axially inner edge of the strips adjacent the lateral end of the narrowest belt layer in an area W_S measuring one inch wide axially inwardly extending, the cords per inch in the area defined W_S being 101% to 200% times the cords per inch X in the area defined by W_C.

13. A pneumatic tire having a tread carcass and a belt reinforcing structure, the belt reinforcing structure comprising:

a composite belt structure of cord reinforced layers including at least two radially inner zigzag belt layers, each inner zigzag belt layer having cords inclined at 5 to 30 degrees relative to the centerplane of the tire extending in alternation to turnaround points at each lateral edge, and at least one spirally wound belt layer having cords wound spirally at an inclination of 5 degrees or less relative to the tire's centerplane and located radially outward of the at least two radially inner zigzag belt layers, and the distance between the lateral edges of the widest belt layer define the belt width W, and

wherein each zigzag belt layer is formed by a continuous strip of two or up to 20 cords, the strips having a strip width S_W and edges spaced apart a distance of 0 to 2 mm in a central portion occupying at least 50% of the belt width W and in each shoulder portion occupying 25% or less of W the edges of

the adjacent strips within a layer are overlapping to form a belt having the cords per inch greater in the shoulder portions than the central portion.

14. The pneumatic tire of claim 13, the belt reinforcing structure further comprising:

at least one spiral wound belt layer; and

at least two radially outer zigzag layers, the radially outer zigzag belt layers being positioned between the tread and the at least one spiral wound belt layer, each radially inner zigzag belt layer having cords wound in alternation at an inclination of 5 degrees to 30 degrees relative to the centerplane of the tire to turnaround points at each lateral edge of the belt layer.

15. The pneumatic tire of claim 13 wherein the overlapping of the adjacent strips in each zigzag layer ranges from greater than 0% of the strip width to 100%.

16. The pneumatic tire of claim 14 wherein the composite belt structure has at least five belt layers, two radially inner zigzag belt layers, one or more spirally wound belt layer and two radially outer zigzag belt layers.

17. The pneumatic tire of claim 16, the tire being an aircraft tire having one or more radial plies in the carcass.

18. The pneumatic tire of claim 13 wherein the belt structure has X cords per inch as measured in the central portion centered on the centerplane in an area W_C measuring one inch axially, and at a location in the shoulder portion at the axially inner edge of the strips adjacent the lateral end of the narrowest belt layer in an area W_S measuring one inch wide axially inwardly extending, the cords per inch in the area defined W_S being 101% to 200% times the cords per inch X in the area defined by W_C.